## REMARKS/ARGUMENTS

Claims 1-22 remain in this application for further review. Even though applicant believes that the claims are allowable as written, claims 1, 4 and 10 are amended to further clarify the present invention. No new matter has been added.

### I. A Note on A Related Application

Applicant notes that U.S. Patent Application Number 09/939,162 received a Notice of Allowance on April 6, 2005. The primary inventor of the application is Trishul M. Chilimbi, who is the primary inventor in this application. The Examiner of U.S. Patent Application Number 09/939,162, Kuo Liang J. Tang, cited to *Larus*, Whole Program Paths (May 1999) (hereinafter "Larus") during the prosecution of U.S. Patent Application Number 09/939,162. This reference was overcome through amendment to receive the Notice of Allowance in that case.

### II. Rejection of Claims 1-22 under 35 U.S.C. 102(b)

Claims 1-22 were rejected under 35 U.S.C. 102(b) as being anticipated by *Larus*, Whole Program Paths (May 1999) (hereinafter "Larus"). Applicant respectfully disagrees with the rejection. Even though applicant believes that the claims are allowable as written, claims 1, 4 and 10 have been amended in order to clarify the invention and expedite this matter.

#### A. Claim Elements Not Taught or Suggested By Reference

Applicant's amended independent claim 1 includes the following elements that are not taught or otherwise suggested by the cited reference:

"identifying repetitively occurring data access sequences ***and non-repetitively occurring data access sequences*** in the trace file" (Emphasis added).

"using the identified sequences to create a modified trace file, ***wherein the modified trace file includes data associated with the frequency that repetitively occurring data access sequences follow other repetitively occurring data access sequences when non-repetitively data access sequences are ignored***" (Emphasis added).

Applicant's amended independent claim 10 includes the following elements that are not taught or otherwise suggested by the cited reference:

"***identifying repetitively occurring data access patterns and non-repetitively occurring data access patterns***" (Emphasis added).

"updating a data structure to reflect ***the frequency that repetitively occurring data access patterns follow other repetitively occurring data access patterns when non-repetitively data access patterns are ignored.***

Applicant's independent claim 17 specifically recites the following elements that are not taught or suggested by the Larus reference:

"a stream flow graph structured to store data that indicates ***a frequency that a data access sequence follows another data access sequence.***" (Emphasis added).

"a ***pre-fetcher*** configured to use the data access information and the stream flow graph to ***fetch data elements into memory*** for use by the executing computer program." (Emphasis added).

Applicant's independent claim 21 specifically recites the following elements that are not taught or suggested by the Larus reference:

"a ***cache memory manager*** coupled to the stream flow graph database and the data access sequence database, wherein the ***cache memory manager is configured to arrange data elements of a repetitively accessed data stream*** in a cache using information from the two databases." (Emphasis added).

B. **Specification of the Present Invention**

The above amendments to claims 1 and 10 do not include new matter. The specification of the present invention specifically recites as follows:

> "Hot data streams 330 may be sent to stream flow graph detector 320 and/or hot data streams abstractor 315. Stream flow graph detector 320 may use the WPS created by path extractor 305 in conjunction with hot data streams 330 to create stream flow graph 325. A stream flow graph shows the number of times in a trace each hot data stream immediately follows another hot data stream, when intervening cold references are ignored. For example, in stream flow graph 325, the hot data stream designated by B' follows the hot data stream designated by A' 4 times and follows itself once. In addition, the hot data stream represented by A' follows the hot data stream represented by B' 5 times.
>
> The following example illustrates this in a relatively simple WPS. Assume a WPS of **CB ABC** EF **CB ABC** FF **CB ABC CB ABC CB** D **CB ABC** (where spacing is added for readability and hot data streams are shown in bold). ABC directly follows CB 5 times and CB directly follows ABC 4 times and itself once (ignoring intervening cold references). In some senses, stream flow graphs may be thought of as control flow graphs for data accesses. In a more complicated stream flow graphs, many hot data streams may be interconnected by edges showing how often each hot data stream follows another." (Page 11, lines 9-25).

The portion of the specification cited above is but one example from the specification and does not represent the breath of any claim term. This citation is for explanatory purposes only and not meant to impute any limitations into the claims apart from the claim language itself insofar as application asserts that the terms of the claims are clear.

C. ***Larus*, Whole Program Paths (May 1999).**

Applicant asserts that Larus does not teach or otherwise suggest at least the above-recited elements of the independent claims. Below is a detailed explanation of the portions of the Larus reference cited in the Office Action. Applicant believes that this explanation will shed light on the distinction between the Larus reference and the claims of the present invention.

## 1. Section 3.1 - SEQUITUR Algorithm

Section 3.1 of Larus, does not teach "identifying repetitively occurring data access sequences and non-repetitively occurring data access sequences in the trace file." Larus does not teach "using the identified sequences to create a modified trace file, wherein the modified trace file includes data associated with the frequency that repetitively occurring data access sequences follow other repetitively occurring data access sequences when non-repetitively data access sequences are ignored." Also, Larus does not teach "updating a data structure to reflect the frequency that repetitively occurring data access patterns follow other repetitively occurring data access patterns when non-repetitively data access patterns are ignored."

SEQUITUR is a formula used to represent a data access sequence. SEQUITUR uses formulas provide representations of the sequence or string when elements are repeated. However, the entire string or sequence is still associated with the formula. Stated another way, the entire data access sequence is "unwound" when the formulas are calculated. Elements of the data access sequence are not eliminated.

The SEQUITUR algorithm follows two rules. The first rule is referred to as the Digram Uniqueness Property Rule. A digram is a pair of consecutive symbols. For example, in the sequence (abca), the symbols (ab) may be considered a digram. If two of the same digrams exist, SEQUITUR replaces both occurrences of the digram with a non-terminal symbol. For example, digram uniqueness property rule may work as follows:

| | |
|---|---|
| S = abca | SEQUITUR does not apply because there is not two or more digrams |
| S = abcab<br>S = AcA<br>A = ab | SEQUITUR applies because two (ab)s exist |

In the above example, the symbols (ab) occurs twice. SEQUITUR replaces the symbols (ab) with the symbol (A). The symbol (A) is then set equal to (ab). In this manner, SEQUITUR can reduce the size of a string through a formula representation when repeating elements exist. However, when the formula is calculated, the entirety of the string still exists. SEQUITUR does ignore any data access sequences; it merely represents the data access sequences in a formula. For example, in the above, symbols (ab) are not removed. They still exist in the formula (A=ab). The sequence is merely represented in a different manner through SEQUITUR.

The second rule of SEQUITUR is referred to as the Utility Property Rule. The Utility Property Rule states that all non-terminal symbols (capitalized letters) in a grammar must be referenced more than once by other rules (i.e. A=ab, B=Ac, C=Ad, or D=BC). SEQUITUR exchanges a rule referenced only once with the rules right side. For example, before the Utility Property Rule is applied, a formula may be as follows:

S = abcabdabcabd
S = DD
A = ab
B = Ac
C = Ad
D = BC

When the rule D=BC is expanded, the string ultimately becomes S=abcabdabcabd. However, when SEQUITUR applies the Utility Property Rule to the above algorithm, the algorithm is as follows:

S = abcabdabcabd
S = DD
A = ab
D = AcAd

The formula represents the same string. When D=AcAd is expanded, the string ultimately becomes S=abcabdabcabd. As is shown in the above example, non-terminal symbols (B) and (C) are no longer used in the formula. Their corresponding symbols (Ac) and (Ad) are then moved down into symbol (D). In accordance with the utility property rule, non-terminals (B) and (C) were only used once in the formula; therefore, SEQUITUR exchanges these symbols by including their equation in symbol (D). Such a procedure makes the algorithm more efficient for expanding the sequence. However, the above does not indicate that elements of the ***data access sequence*** are ignored. Both the examples above indicate that S = abcabdabcabd. Elements of the sequence are not removed. The utility property rule merely indicates that the equation for "unwinding" the sequence is written in a certain manner. The data access sequence, however, is the same regardless of the formula used to represent it. Accordingly, Larus does not teach all the elements specifically recited in independent claims 1 and 10.

**2. <u>FIGURES 1, 2 and 7.</u>**

Moreover, FIGURES 1-3 of Larus, do not teach the limitations specifically recited in claims 1 and 10. FIGURES 1 and 2 of Larus are functional block digrams. FIGURE 1 depicts that the Whole Program Path is sent for analysis to find performance bottlenecks or program errors.

FIGURE 2 depicts a SEQUITUR grammar and a whole program path that represents the SEQUITUR grammar. The Whole Program Path represents the SEQUITUR grammar through arrows. For example, referring to FIGURE 2, the SEQUITUR grammar C = BB is represented in the Whole Program Path by a (C) node having two arrows pointing to the (B) node. In this manner, the entire SEQUITUR sequence may be represented through Whole Program Paths.

FIGURE 7 represents an algorithm or program for finding minimal hot subpaths whose length is between MinStringLength and MaxStringLength and cost greater than MinCost. FIGURE 7, merely teaches finding sequences that have a certain length and occur a certain number of times. Applicant can find no teaching or suggestion in the aforementioned figures (and accompanying text) of the elements specifically recited in independent claims 1 and 10. Applicants respectfully request that the Examiner point out with specificity the specific text or digram of Larus that teaches this element. If this element is not specifically taught or suggested, applicants request a notice of allowance of claims 1 and 10.

3. **Section 3.2 - SEQUITUR Enhancement**.

Section 3.2 of Larus does not teach "a stream flow graph structured to store data that indicates a frequency that a data access sequence follows another data access sequence." Also, Section 3.2 of Larus does not teach "a pre-fetcher configured to use the data access information and the stream flow graph to fetch data elements into memory for use by the executing computer program." Section 3.2 of Larus pertains to enhancing the SEQUITUR algorithm by looking ahead a single symbol before introducing a new digram rule. When the algorithm does not look ahead one symbol, representation of the same occurrences can vary, because rules introduced while processing a first occurrence may change the sequences of reductions applied to a second occurrence.

Applicant can find no teaching or suggestion of the elements of independent claim 17. Applicant respectfully requests that the Examiner point out with specificity in Section 3.2 the specific text or digram of Larus that teaches this element. If this element is not specifically taught or suggested, applicants request a notice of allowance of claim 17.

## 4. FIGURE 2 and Whole Program Paths

Neither FIGURE 2 of Larus nor the discussion pertaining to Whole Program Paths teach or otherwise suggest "a cache memory manager coupled to the stream flow graph database and the data access sequence database, wherein the cache memory manager is configured to arrange data elements of a repetitively accessed data stream in a cache using information from the two databases." Moreover, such elements are not inherent in the Larus reference.

As previously stated, FIGURE 2 depicts a SEQUITUR grammar and a whole program path the represents the SEQUITUR grammar. The Whole Program Path represents the SEQUITUR grammar through arrows. For example, the SEQUITUR grammar C = BB is represented in the Whole Program Path by a (C) node having two arrows pointing to the (B) node. In this manner, the entire SEQUITUR sequence may be represented. There is no teaching in FIGURE 2 of a cache memory, let alone, any teaching of a cache memory manager configured to arrange data elements of a repetitively accessed data stream in a cache using information from the stream flow graph database and the data access sequence database.

Larus does not inherently teach the elements of claim 21. "To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill." *In re Robertson*, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999). Applicant can find no mention of a ***cache memory manager*** in the entire Larus document. In addition, applicant cannot find any teaching or suggestion of ***a cache memory manager that is configured to arrange data elements of a repetitively accessed data stream in a cache using information from a stream flow graph database and a data access sequence database.*** Applicant

respectfully requests that the Examiner specifically point out some teaching or suggestion in Larus with regard to independent claim 21 or clarify the aforementioned inherency rejection. In the absence of one of the two, applicants respectfully request notice of allowance of claim 21.

C. **Claims 2-9, 11-16, 18-20 and 22**

Claims 2-9, 11-16, 18-20 and 22 ultimately depend from claims 1, 10, 17, and 21, respectively. Applicant asserts that each of the claims recite allowable subject matter. Moreover, claims 1, 10, 17, and 21 are clearly allowable for the reasons set forth above, and therefore, applicant asserts the claims 2-9, 11-16, 18-20 and 22 are allowable for at least those same reasons.

## III. Request For Reconsideration

In view of the foregoing, all pending claims are believed to be allowable and the application is in condition for allowance. Therefore, further reconsideration and a Notice of Allowance is respectfully requested. Should the Examiner have any further issues regarding this application, the Examiner is requested to contact the undersigned attorney for the applicant at the telephone number provided below.

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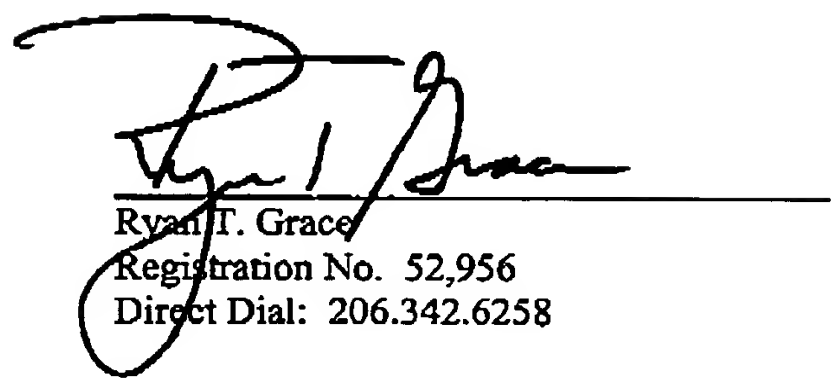
Submission under 37 C.F.R. 1.114

Respectfully submitted,



MERCHANT & GOULD P.C.



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